

lamp, mounted in the same way that is so well described by Mr. Burnham in the March number of these *Notices*. The first lamp made on this plan, some three or four years ago, was attached to the micrometer direct (I have brought this to show how in certain positions the smoke from the lamp comes on to the micrometer or into the observer's eye). This plan was altered to that shown in the account of my 3-foot Reflector in the *Memoirs*, vol. xlv.—that is, attached to the position circle, and with means of varying the intensity and colour of the light—a necessary thing. This with an improved micrometer makes a very serviceable instrument.

Incandescent platinum wire was tried; and this, from the fact that it can be used anywhere and requires, therefore, no reflector, gave hope, but the wire when heated high enough to give a good light is apt to burn on the slightest increase of current.

Vacuum tubes were tried, but the experiment of one shock on the eye from the small coil used was sufficient.

Lately I have tried the small incandescent carbon lamps that are now produced commercially, and can be readily obtained. These are made as small as five-candle power, and as this is quite enough for any purpose, and they can be used at any required power under this, and will last a long time, they seem to be the very things for the work. These lamps are now very well known, and their advantages for this special work are very great. The only thing that may be a trouble is the production of the current of electricity. Where a large number could be used about an observatory, the use of a dynamo-machine driven by power would be best, but in ordinary cases, where the great difficulty is only with the micrometer, a small battery of, say, five bichromate cells will do well, and by a cord worked by the foot or any other means, the light can be produced or varied by lowering the plates in the solutions. The wires may be led anywhere and the connection with the micrometer made either by flexible wire or by insulated rings and contact springs, in a way that will naturally be apparent to one.

From the trials I have made I consider it well worth trying by anyone who is not satisfied with the old oil lamp.

1882, May 12.

On the Solar Spots of April and May 1882. By the
Rev. F. Howlett.

The great solar spot which, according to the observations of the Astronomer Royal and Mr. Whipple of the Kew Observatory, first made its appearance on the visible disk in the Sun's southern hemisphere on April 13, 1882, was in every way worthy of the Sun-spot maximum of the present epoch, accompanied as it was with remarkable magnetic storms, which com-

menced on the 14th, but which more especially manifested themselves, as I was informed at Kew, on the night of the 16th till about 8 P.M. on the 17th, after which they diminished until about 3^h 20^m of the 20th of the same month, when they were again very active.

Strong Earth currents considerably interfered at times with telegraphic communication, especially on the 17th aforesaid, not only in this country, but at Brussels, and doubtless many other parts of the world.

At Alton I was informed by the Post Office authorities that the dial plate of their telegraphic apparatus had to be turned round many degrees before the needles were free to oscillate. As regards the magnitude of the largest spot, on April 19, at 3^h 30^m P.M. this had a length of about 2' 15'', with a mean breadth of about 1' 15'', and which, making due allowance for irregularities of contour, implies a superficial area of not less than 2,050 millions of square miles.

Another large pair of spots, which preceded the former one just described, were each about 65'' in mean length and breadth, possessing, therefore, a joint area of about 855 million square miles, whilst the remaining small spots contained about 730 millions; making a total disruption of the solar photosphere of not less than 3,644 millions of square miles—a condition of things which I have not seen equalled since the still more wonderful outbursts of February 1870, when a group was on the disk subtending 6' of arc, or of September 21 of the same year, when the total area occupied by the various groups amounted at one time to not less than 5,000 million square miles. I possess a superb photograph of the disk of that date 2 feet in diameter.

I would observe also that the forms assumed by the great spot of April of the present year not a little resembled those of the memorable outburst of August and September 1859, which were distinguished also by very remarkable and repeated magnetic storms. The principal spot of April of the present year was characterised, as then also, by a very peculiar whirling or cyclonic-looking disposition, especially during the earlier stages of its development, and was accompanied, as was the case in August 1859, by a large pair of associated spots on another part of the disk, which, however, *followed* the principal group in 1859, but *preceded* it in April 1882.

Some fine and interesting spots have been also visible during the present month of May, one of which, making due allowance for the time required by a synodic revolution of a spot, would appear to be the diminished representative of that of April 13; but of this I am not sure.

On May 8th a fine and conspicuously round spot was to be seen nearly in the middle of its passage across the Sun's northern hemisphere, and having a mean diameter of about 46''. It is not often that neatly-rounded spots of such magnitude are seen on the disk.

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